

THEORETICAL AND EXPERIMENTAL STUDY OF THE TELEPHONE RECEIVER.

By A. E. KENNELLY.

Professor of Harvard University and of the Massachusetts Institute of Technology.

[Lectures given at the "Ecole Supérieure des Postes et Télégraphes, Paris. Translated by J. G. Hill, from "Les Annales des Postes Télégraphes et Téléphones," for February, 1923.]

CHAPTER I.

GENERAL DESCRIPTION.

A TELEPHONE receiver consists essentially of: a case or shell in which the working parts are arranged; an electro-magnetic system, and a vibrating diaphragm.

Electro-magnetic System.—The form and dimensions of this system vary with each type of apparatus. It consists essentially of a permanent magnet, of which one or both of the poles are exposed to the magnetising action of a coil. This pole or poles attract the diaphragm.

We will give a few figures to fix the order of magnitude of the magnetic constants of the magnet.

In an ordinary bipolar receiver, the section of each pole piece is approximately $S = 0.25 \text{ cm}^2$.

In the state of rest, the magnetomotive force, which characterises the state of permanent magnetisation, is of the order of $F = 200$ gilberts.

The diaphragm is at a distance from the face of the poles $x = 0.075 \text{ cm}$. The principal term of the reluctance of the magnetic

circuit being the reluctance of the air $R = \frac{2x}{S} = \frac{0.15}{0.25} = 0.6 \text{ œrsted}$.

The flux of induction is therefore $\varphi = \frac{F}{R} = \frac{200}{0.6} = 330 \text{ maxwells}$.

And the flux density itself: $B = \frac{\varphi}{S} = \frac{330}{0.25} = 1,320 \text{ gauss}$. The